

# TOWN OF LOXLEY

## Standard Specifications for Water Mains, Sanitary Sewers and Pump Stations

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MOBILE, ALABAMA

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**PART 1 - WATER FACILITIES****1.1 PIPELINES**

- A. Minimum line size six (6) inch unless specifically approved otherwise
  - 1. Flexible joint pipe shall meet the requirements of AWWA Specification C151 and may be of the bolted or boltless type suitable for 150 psi working pressure
- B. Pipe shall be Cement-lined Ductile Iron (Cl. 51) or PVC (Cl. 200 SDR 21 – White or Blue)
- C. Polyvinyl chloride (PVC) plastic pipe in sizes 4 inch and greater in diameter shall conform to the requirements of AWWA C900, “Standard for Pressure Pipe with Cast Iron Pipe Outside Diameter.” Pipe shall be a minimum Class 150 (UL 235) with a Standard Dimension Ratio of 18 or heavier. Pipe joints shall be integral bell and spigot type with rubber ring sealing gasket. Lubricant for making joints shall be non-toxic, and shall be as recommended by the pipe manufacturer. The pipe bell shall be designed to be at least as strong as the pipe wall. Standard lengths shall be 20 feet except that 15 percent of total footage for a particular project may be random lengths of not less than 10 feet each. Each piece of pipe shall be tested by the manufacturer to 600 psi for a minimum of 5 seconds. The bell shall be tested with the pipe. Ductile iron fittings conforming to the requirements of these specifications shall be used with PVC pipe.
- D. Contractor shall furnish written certification, accompanied by a copy of test results, that the pipe and pipe material has been sampled, tested, and inspected as required in AWWA C900. These certifications and test results shall be submitted, in five (5) complete copies, to the Engineer for review and the pipe manufacturer shall retain duplicate copies of all test results in permanent files to be made available upon request.
- E. The tests and certifications shall be of such frequency as to be representative of the entire Project.
- F. Polyvinyl chloride (PVC) plastic pipe for diameter sizes less than 4-inch shall conform to the requirements of ASTM D-2241 and shall be minimum SDR 21 Class 200 manufactured from a Type I, Grade I polyvinyl chloride compound with a cell classification of 12454 per ASTM D1784. Pipe joints shall be integral bell and spigot type with rubber ring sealing gasket. Lubricant for making joints shall be non-toxic, and shall be as recommended by the pipe manufacturer. The pipe bell shall be designed to be at least as strong as the pipe wall. Bells shall be manufactured so that o-rings gaskets are square to the barrel of the pipe. Standard lengths shall be 20 feet except that 15 percent of total footage for a particular project may be random lengths of not less than 10 feet each. Ductile iron fittings conforming to the requirements of these specifications shall be used with PVC pipe. Fittings shall be mechanical joint and shall be provided with a transition gasket specifically designed to accommodate the outside diameter of the pipe.

- G. For all PVC pipe, the Contractor shall furnish written certification, accompanied by a copy of test results, that the pipe and pipe material has been sampled, tested and inspected as required in ASTM D 2241. These certifications and test results shall be submitted, in five complete copies, to the Owner/Engineer for review and the pipe manufacturer shall retain duplicate copies of all test results in permanent files to be made available upon request. The tests and certifications shall be of such frequency as to be representative of the entire Project.
- H. Where specifically approved for directional drill installation, pipe shall be HDPE (DR 11 with Blue marker stripe)
- I. Minimum of eighteen (18) LF of restrained pipe shall extend in each direction from all valves, fittings, and specials. All fire hydrant leads shall be six inch (6") restrained MJDIP from main line fitting to hydrant.
- J. Pipes 16 inches and larger shall have minimum cover of 48 inches, and pipes smaller than 16 inches shall have minimum cover of 30 inches, except where otherwise noted on the Plans. At street intersections or where the new pipe lines cross existing or proposed underground lines at the approximate same depth as the new line, the cover shall be increased and the new line laid below the existing or proposed pipe lines. Where the new pipe line crosses existing or proposed ditches, the top of the pipe shall be a minimum of 36 inches below the existing or proposed invert of ditch, whichever is lower, except where noted.
- K. Pipeline shall have no visible leaks or deficiencies.
- L. All pipeline shall include a locator wire with reinforced protective exterior coating (12 ga., Solid, Blue Color, Brass Split Bolt Connectors) installed centered on and 12" - 18" above pipeline. Wire shall be Copperhead or approved equal and shall extend to grade within valve boxes with minimum 12" slack. Split bolt connectors and bare wire ends at all connections and splices shall be acceptably coated to prohibit corrosion.
- M. Pipeline shall pass an acceptable bacteriological test series performed by an acceptable, certified laboratory on two (2) consecutive-day samples collected at a minimum 24-hour interval encompassing not more than 5000 LF of pipeline. Contractor to furnish appropriate sample bottles, collect the samples in the presence of Loxley, and deliver sealed samples to Loxley for transport to the laboratory. Contractor shall identify an acceptable local ADEM-certified testing laboratory, make all arrangements for testing, and be responsible for all costs thereof. Loxley shall deliver collected, sealed samples to the laboratory. Contractor shall arrange for all testing results to be certified by the laboratory and reported to Loxley and such other parties as the Contractor desires. Should successful bacteriological tests not result, Contractor shall take appropriate actions and repeat the process until successful test results are obtained. The Town of Loxley will provide water and sample delivery for the initial test sequence without charge. Additional water requirements and sample transport may be subject to charge.
- N. Hydrostatic Test Requirements - Pipeline shall be successfully hydrostatically tested at a minimum of 150 psi (+/- 5 psi) for a 6-hour period. Test pressure shall

be monitored via a recording pressure chart (minimum 12-inch chart diameter) located at the highest elevation within the test section. At conclusion of the test period, the last test step shall be a pump-up to initial test pressure. Test shall be terminated, while recording pressure chart remains connected, by a bleed-off of test pressure from a site within the test section remote from the recorder location to confirm entire test section is active. Total gallons used during the test, inclusive of final pump-up, shall be measured by a suitable, certified-accurate water meter and, for the test to be considered acceptable, shall not exceed 2.62 gallons per inch-diameter per mile of pipeline tested. The test chart, with annotations thereon regarding the calculation of leakage and bearing a statement regarding test success, shall be certified by an Alabama-registered Professional Engineer. The recording pressure chart utilized for this test shall have been certified accurate by a recognized entity not more than six (6) months prior to the test and a copy of such certification shall be furnished with the test chart.

- O. All test results, with the exception of bacteriological test results, to be certified by an Alabama-licensed Professional Engineer.
- P. All water line to be installed by direct bury under an existing or proposed traveled way and/or vehicle parking area shall require enhanced trench backfill methods acceptable to The Town of Loxley or be constructed using Ductile Iron Pipe to points at least ten (10) feet beyond the limits of the traveled way/parking area.

## **1.2 FLUSHING HYDRANTS**

A. Flush hydrants shall be Kupferle Eclipse No. 2, Mueller A-423 or approved equal, with: 2 ½ inch nozzle locking cap

- 1. 3 inch mechanical joint inlet
- 2. 3'6" bury

## **1.3 FIRE HYDRANTS**

A. All hydrants shall be Mueller Super Centurion 250, or approved equal, and shall conform with AWWA Standard C502, be Underwriters Laboratories Listed and shall meet the following specifications:

- 1. Minimum of 10 year warranty on material and workmanship.
- 2. Open CCW, 5 ¼" Main Valve, 2" Operating Nut, MJ, Painted Red
- 3. 200 psi working pressure, 400 psi hydrostatic test pressure
- 4. Breakaway traffic flange type
- 5. Hydrant set plumb and nominally one foot inside right of way with pumper nozzle normal to roadway center
- 6. All fire hydrants shall be minimum six inch (6") restrained MJ DIP from main line fitting to hydrant and shall include a hydrant isolation gate valve.

## **1.3 GATE VALVES AWWA C515**

A. Gate Valves - All valves shall be non-rising stem for underground direct burial

service and shall close when the operating nut is turned in clockwise rotation. Valves shall be as manufactured by Mueller 2360 series, or approved equal, and be the resilient seat type or equal in accordance with and meet the requirements and recommendations of the latest published AWWA Specification C500. Stem sealing shall be provided by O-Ring packing. Valves shall be furnished complete with necessary gaskets, bolts, nuts as needed for mechanical joint ends. Mechanical joints and accessories shall comply with the latest published AWWA Specification C111. Gaskets shall be of best grade quality of a type suitable for potable water service. Gate valves shall be required on all pipe sizes up to and including eight (8) inch.

#### **1.4 BUTTERFLY VALVES**

- A. Butterfly valves shall be required on all valves greater than eight (8) inch. Butterfly valves are to be Mueller Lineseal III or approved equal, and shall be manufactured in accordance with the latest revision of AWWA C504 for Class 150B service and meeting the following specifications:
- B. General - Butterfly Valves shall be rubber seated for 150 psi minimum working pressure and line velocities up to 16 fps. The operators shall open the valves on a counterclockwise rotation of the operator wrench, and nut which shall be AWWA 2 inch square cast iron. Operators shall be totally enclosed and permanently lubricated for direct burial of the valves and frequent submergence in water up to 20 feet of head. Valve, except for seating, shall be coated in accordance with TT-C-494A and AWWA C504 with an epoxy coating per SSPC-SP10 to a minimum of 7 mils in compliance with AWWA C550.

#### **1.5 AIR RELEASE VALVES**

- A. Air release valves, when required, shall be located at high points in the line and shall be properly sized for the installation. Air release valves shall be combination style with features of both an air release valve and air & vacuum valve. Flanged fittings shall comply with AWWA C110 and have ANSI B16.1, Class 125, flanges. Models shall be stainless steel. Owner will give consideration to outer material provided interior components are stainless steel. Final decision on material will be in the sole opinion of the Owner based on field conditions and maintenance.
- B. In the case of main line size less than six inch (6"), a Post Hydrant with main line size isolation valve shall be installed at the end of the pipeline. Specific approval required for any other use of a Post Hydrant.

#### **1.7 RETAINER GLANDS**

- A. Restrained Joint Gland (MegaLug) - Shall be EBAA series 1100 for ductile iron and series 2000PV for PVC, or EBAA series 3100 for both, or equal. Glands shall be manufactured of ductile iron conforming to ASTM A536-80. Restraining devices shall be treated to a minimum hardness of 370 BHN dimensions of the gland shall be such that it can be used with the standard mechanical joint bell and tee head bolt. Romac GripRing for DIPS or IPS shall also be accepted.

1. Ductile Iron, MJ, Wedge-type, Twist-off Torque Nuts
  2. Specifically rated for use on the specific pipeline material
  3. EBAA Iron, Sigma, Star, Tyler Union, or approved equal Fittings
- B. Ductile Iron Fittings: Ductile iron shall be mechanical joint except where noted otherwise on the plans. Fittings shall be suitable for use at 250 psi working pressure and shall conform to AWWA Specification C110. Fittings shall be cement-mortar lined and the exterior coated with an approved bituminous coating, in accordance with AWWA Specification C104. At the Contractor's option, compact ductile iron fittings meeting AWWA C153 may be furnished.
- C. Positive Restrained Joint Pipe and Fittings: Positive restrained joint pipe and fittings may be used in lieu of friction restrained fittings. Positive restrained joint pipe and fittings shall be either mechanical joint or push-on joint and shall be manufacturer's standard restrained joint. The joint shall achieve restraint by means of a positive factory made, metal-to-metal contact and shall allow full deflection of the joint when made up.
1. AWWA C110 or C153, Cl. 350
  2. Ductile Iron, Cement Mortar Lined, MJ Tapping
- C. Tapping sleeves being 12" x 12" and smaller shall have minimum working pressure of 200 psi and larger sleeves shall have a working pressure of 150 psi.

### **1.8** SLEEVES FOR MAIN LINES

- A. Full encirclement end and/or body gaskets to completely encapsulate the tap zone and Test Ports
- B. Ductile Iron or Stainless Steel construction
- C. Mueller, JCM, Romac, or approved equivalent

### **1.9** SERVICES

- A. Taps Onto Main Lines
  1. All main line service taps require use of service saddles.
  2. For PVC or HDPE main lines up to 8" - Service saddles shall feature double stainless steel straps or shall be hinged brass.
  3. For all DIP and PVC or HDPE greater than 8" - Service Saddles shall feature double stainless steel straps.
  4. Service Saddles shall be Mueller, JCM, McDonald, Romac, or approved equal. Service brass shall be as specified elsewhere herein.
- B. Service Brass - Mueller or McDonald
- C. Service Tubing - 3/4" Type K Copper with no joints between main tap and meter site
- D. Curb Stop - shall be service size with integral lock wing, brass.

E. Meter Boxes

1. Standard Box - Plastic Meter Box, 12" Deep, 16 1/2" x 11 7/8" Nominal Dimensions, Black, 2 Mouse Holes, Hinged Flush Cover marked "WATER METER". Carson Model 1015-1093, or prior approved equal.
2. Jumbo Box - Plastic Meter Box, 12" Deep, 15" x 21" Nominal Dimensions, Black, 2 Mouse Holes, Flush Cover marked "WATER METER" with Hinged CI Reader Eye. Carson Model 0012-1011, or prior approved equal.

F. Service box shall be set at the Right-of-Way/Easement line normal, or as nearly as possible thereto, to the location of the associated main line tap. Any deviations shall require specific written approval.

G. If roadway at service location has or is to have a concrete curb/gutter, station of the service box shall be identified by a "W" stamped into the concrete curb/gutter normal to the service box location.

**1.10** DRY TAPS PROHIBITED

A. No pipeline taps of any nature intended for ultimate or subsequent use for delivery of water service for any purpose shall be made to any water system pipeline prior to the pipeline being acceptably certified to The Town of Loxley to have successfully passed specified hydrostatic and bacteriological tests and the pipeline is continuously maintained filled with potable water at local service pressures.

**1.11** WATER METERS

A. Water meters shall be Master Meter Allegro Multi-Jet Water Meters with all bronze maincase, direct reading, 3G Interpreter Register with leak detector, and registration in gallons. Meters shall be configured for and include all components required to enable remote electronic reading.

**1.12** BACKFLOW PREVENTERS

A. Every service connection of any type (residential, commercial, industrial, fire, irrigation, etc.) to the Town of Loxley water system shall incorporate an acceptable and approved Backflow Preventer properly installed immediately on the customer side of the service meter prior to any service line branches, subconnections, or facilities. Required type of Backflow Preventer shall be as determined by The Town of Loxley to be commensurate with the risk hazard level of the service connection. Backflow Preventers shall be as manufactured by Watts Regulator Company of the series/type identified below, or approved equal. For general guidance, the following guideline is to be followed:

- |                 |                      |
|-----------------|----------------------|
| Low Hazard      | - Dual Check Valve   |
| Moderate Hazard | - Series 709 Highest |
| Hazard          | - Series 909         |

**1.13** PIPELINE & VALVE MARKERS

A. Pipeline markers shall be fiberglass. Marker shall have a minimum ground



penetration of 18” and shall extend a minimum of 36” above local grade. Marker shall be Blue in color throughout its mass. Marker shall be installed at not greater than 1000-foot intervals along the pipeline route positioned at the nearest Right-of-Way / Property line.

- B. Each marker shall be affixed with four (4) permanent, reflective decals legibly presenting the following information and arranged in the following order (top to bottom) on the marker:

Reflective Decal (No Text)

“Caution Water Pipeline”

“The Town of Loxley (251-964-5162) CALL BEFORE DIGGING” “Normal  
Offset From Marker \_\_\_\_\_ Feet”

- C. The offset distance shall be measured normal from the pipeline and shall be entered into the blank using indelible marking. Marker shall be as manufactured by Carsonite, or approved equal.
- D. The Town of Loxley shall furnish all decals to be affixed by installer to the blank marker provided by the installer. Installer shall determine and enter offset measurement.

## **PART 2 - SANITARY SEWER FACILITIES**

### **2.1 SEWER MAINS**

- A. Gravity Sewer pipe - SDR 35 PVC (Green) or Asphaltic-lined Ductile Iron (Cl. 52 min.) Pipeline depths greater than fifteen feet (15') shall require pipe material approval by The Town of Loxley.
- B. Pressure Sewer pipe - See Force Mains
- C. Minimum gravity sewer size shall be eight (8) inch
- D. Minimum gravity sewer grade 0.4% unless specifically approved otherwise
- E. Sanitary sewer gravity mains that parallel a creek, drainage pipeline, drainage ditch or other obstruction shall be of sufficient depth to allow sanitary sewer lateral connections to be extended under the obstruction. Under no circumstances shall the top of a sanitary sewer main or lateral have less than eighteen (18) inches of cover below a stream bed or drainage ditch. Concrete encasement and ductile iron pipe shall be required when the cover from the top of the pipe to the stream bed or ditch bed is less than 30 inches.
- F. Sanitary sewer mains shall not be installed under or within 10 feet horizontally of any water impoundments, including ornamental water features, retention ponds, or fountains.
- G. The minimum cover from the top of the pipe of all sanitary sewer mains shall be four (4) feet to finished subgrade under roadways and three (3) feet to finished grades elsewhere. Cover of mains to less than minimum depths shall require written approval by The Town of Loxley

- H. Sanitary sewer mains shall have a minimum vertical separation of twelve (12) inches between storm sewer pipes when the horizontal separation is three (3) feet or less. Where sanitary and storm sewers cross with a vertical separation of less than eighteen (18) inches, a minimum of one (1) full joint of ductile iron pipe shall be centered at the crossing and backfilled with 3000 psi concrete or excavatable flowable fill that meets or exceeds ALDOT requirements.
- I. There shall be a minimum of five (5) feet of horizontal separation between parallel gravity mains and/or force mains.
- J. Sanitary sewer mains shall have a minimum horizontal separation of ten (10) feet from all water mains, unless the sanitary sewer main is more than eighteen (18) inches below the bottom of the water main and there is a horizontal separation of at least 36 inches from the closest pipe joints.
- K. Where sanitary sewer mains cross beneath water mains with a vertical separation of eighteen (18) inches or less, or where water mains cross under sanitary sewer mains, a minimum of one (1) full joint of ductile iron pipe shall be centered at the crossing and the annular space between the crossing shall be backfilled with an excavatable flowable fill that meets or exceeds ALDOT requirements. The water main shall be centered at the point of crossing, which shall be at an approximate 90 degree angle.
- L. Connectors to join pipes of dissimilar materials or sizes without manufactured joints and/or without use of specialty fittings shall feature a flexible sleeve in contact with the pipeline externally reinforced by a full encapsulation stainless steel shear ring and the entire assembly shall be secured to the pipe with stainless steel bands. Connectors shall be Fernco Series 5000 Strong Back, Mission Flex-Seal ARC, or approved equal.
- M. Pipeline shall pass an acceptable industry-standard “flashing” test that clearly demonstrates pipeline alignment
- N. Pipeline shall pass an acceptable industry-standard “go - no go” mandrell test
- O. Pipeline shall pass an acceptable industry-standard low-pressure air test
- P. Pipeline shall be internally inspected via closed-circuit television to demonstrate existence of no visible leaks or deficiencies
- Q. All test results to be certified by an Alabama-licensed Professional Engineer

## **2.2 GRAVITY SEWER PIPE ENVELOPE REQUIREMENTS**

- A. Prior to pipeline installation, trench shall be excavated to required depth and grade. Trench shall be free of standing/flowing water and any debris/objects of dimensions or characteristics that could be deleterious to pipeline integrity. A minimum six inch (6”) depth of Foundation material shall be placed in the trench, compacted, graded, and shaped for the pipe barrel prior to placement of the pipeline. After placement of the pipeline, and after proper pipeline grade and alignment have been established, haunching material shall be placed up to the pipe spring line. Upon re-confirmation of pipeline grade and alignment, Initial

Backfill shall be placed to an elevation twelve inches (12") above the pipe crown. Placement of trench backfill shall then proceed in six inch (6") compacted lifts to surface grade. Materials used for 'Foundation", "Haunching", and "Initial Backfill" shall be angular stone (with no dimension greater than ¾"), gravel, or sand.

### **2.3**    CONCRETE MANHOLES

- A.    Constructed of precast concrete in conformance with ASTM C478
- B.    All manholes serving as a termination point for any sanitary sewer force main shall be lined with a sprayed-on polyurethane liner after installation (Sprayroq, or approved equal).
- C.    Mastic joint seals and no visible leaks or deficiencies
- D.    Integral anti-flotation collar
- E.    Type II cement and 100% calcareous aggregate. In general, sanitary sewer manholes shall be spaced at a maximum distance of 400 feet
- F.    Minimum four (4) foot diameter. Manholes with an outgoing pipe of diameter greater than 24-inches shall have a minimum inside diameter of five (5) feet.
- G.    Flexible pipeline entry sleeves keyed into manhole wall and secured to pipeline with stainless steel bands
- H.    Manhole Frame and Cover shall be cast iron, non-vented, with non-penetrating pick holes, with "SEWER" cast into the cover and shall be U.S. Foundry No. USF 604-E (8" Rise), USF 170-E (6" Rise), USF 580-E (2 ½" Rise), or approved equal. All manhole frames shall be fully compatible with U.S. Foundry Cover Type E (23 ¾" Diameter, 1 ¼" Thickness)
- I.    Outside drop connections shall be provided when drop exceeds two (2) feet. Drop connection shall be constructed with asphaltic-lined, restrained joint Ductile Iron Pipe (Cl. 52) and Fittings (Cl. 350).
- J.    Force Main and Pressure Sewer Connections shall be at the flow line of the receiving manhole unless specifically approved otherwise.
- K.    Manholes shall pass an acceptable vacuum test certified by an Alabama-licensed Professional Engineer

### **2.4**    Fiberglass Reinforced Polymer (FRP) Manholes:

- a.    Manhole tee bases shall be constructed of mitered sections of FRPM pipes connected with fiberglass reinforced laminations.
  - i.    Manhole cylinders, manway reducers, and connectors shall be produced from fiberglass-reinforced polyester resin using a combination of chop and continuous filament wound process
- b.    Resins: Resins used shall be a commercial grade unsaturated polyester resin or other suitable polyester or vinyl ester resin.
- c.    Reinforcing Materials: The reinforcing materials shall be commercial Grade "E" type glass in the form of continuous roving and chop roving, having a coupling

agent that will provide a suitable bond between the glass reinforcement and the resin.

- i. Fillers, when used, shall be inert to the environment and manhole construction. Sand shall not be accepted as an approved filler. Additives, such as thixotropic agents, catalysts, promoters, etc., may be added as required by the specific manufacturing process to be used to meet the requirements of the ASTM D3753 standard. The resulting reinforced-plastic material must meet the requirements of this specification
- d. Interior Surfacing Material: The inner surface exposed to the chemical environment shall be a resin-rich layer of 0.010 to 0.020-inch thick. The inner surface layer exposed to the corrosive environment shall be followed with a minimum of two passes of chopped roving of minimum length 0.5-inch (13 mm) to maximum length of 2.0-inch (50.8 mm) and shall be applied uniformly to an equivalent weight of 3 oz/ft. Each pass of chopped roving shall be well rolled prior to the application of additional reinforcement. The combined thickness of the inner surface and interior layer shall not be less than 0.10 inch (2.5 mm)
- e. Wall Construction Procedure: After the inner layer has been applied the manhole wall shall be constructed with chop and continuous strand filament wound manufacturing process, which insures continuous reinforcement and uniform strength and composition. The cone section, if produced separately, shall be affixed to the barrel section at the factory with resin-glass reinforced joint resulting in a one-piece unit. Seams shall be fiberglassed on the inside and the outside using the same glass-resin jointing procedure. Field joints shall not be acceptable by anyone other than L.F. Manufacturing, Inc. Giddings, Texas or an approved equal.
- f. Exterior Surface: For a UV inhibitor the resin on the exterior surface of the manhole shall have gray pigment added to a minimum thickness 0.125 inches.
- g. Stubouts and Connections: Where indicated on Drawings, stubout or connection pipe must be performed by sanding, priming, and using resin fiber-reinforced hand lay-up. The resin and fiberglass shall be the same type and grade as used in the fabrication of the fiberglass manhole. Inserta-Tee fittings may be requested and installed per manufacturer's instructions. Kor-N-Seal boots may be installed by the manhole manufacturer using fiberglass reinforced pipe stubouts for the Kor-N-Seal boot sealing surface.
- h. Manhole Bottom: Fiberglass manholes will be required to have resin fiber-reinforced bottom. Deeper manholes may require a minimum of two fiberglass channel stiffening supports. All fiberglass manholes manufactured with a fiberglass bottom will have a minimum 3-inch wide anti-flotation ring. The manhole bottom shall be a minimum of ½ inch thick.
- i. Fiberglass enclosed invert and bench area: A fiberglass enclosed invert and bench area shall be installed in the manhole by the manufacturer. The invert will be formed using a non-corrosive material and completely enclosed in a minimum 1/4-inch layer of fiberglass chop.

- j. Height Adjustment: Fiberglass manholes must have the ability to be height adjustable with the use of a concrete height adjustment ring. Height adjustment can be made as a field operation without the use of uncured resins or fiberglass lay-ups. Fiberglass manholes must maintain all load and soundness characteristics required by A.S.T.M. D3753 after height adjustment has occurred.
- k. Interior Access: All manholes shall be designed so that a ladder or step system can be supported by the installed manhole.
  - i. All manholes risers shall have steps constructed from non-corrosive aluminum alloy equivalent to Neenah R-1982-W or polypropylene equivalent to M.A. Industries, Type PS-1 or PS-1-PF. The steps shall be installed at the factory and in accordance with the recommendations of the step manufacturer. Manholes will not be acceptable if steps are not installed accordingly, and properly aligned vertically.
- l. Manway Reducer: Manway reducers will be concentric with respect to the larger portion of the manhole diameters through 60 inches. Larger manholes may have concentric or eccentric manway reducer openings.
- m. Cover and Ring Support: The manhole shall provide an area from which a concrete grade ring or brick can be installed to accept a typical metal ring and cover and have the strength to support a traffic load without damage to the manhole.
- n. Alignment Changes: Fabricate the tee base through section with a mitered elbow configuration to achieve the required angles shown on the project plans. Maximum angle of each miter is 30 degrees except individual alignment changes up to 35 degrees may be 1 miter.
- o. Elevation Changes: Construct drop configurations as shown on the plans.
- p. Diameter Changes: Accommodate diameter changes at manholes using a reducer on the upstream side of the tee base.
- q. Joints: Assemble the tee base to the line pipes using the same gasket-sealed joint as pipe-to-pipe connections or another gasket-sealed joint as approved by the Engineer.
- r. Manhole Length: Manhole lengths shall be in 6-inch increments +/- 2 inches.
- s. Marking and Identification: Each manhole shall be marked on the inside and outside with the following information:
  - i. Manufacturer's name or trademark.
  - ii. Manufacturer's factory location.
  - ii. Manufacturer's serial number.
  - iii. Total manhole depth
- t. Exterior Surface: The exterior surface shall be relatively smooth with no sharp projections. Handwork finish is acceptable if enough resin is present to

eliminate fiber show. The exterior surface shall be free of blisters larger than 0.5 inch in diameter, de-lamination or fiber show.

- u. Interior Surface: The interior surface shall be resin rich with no exposed fibers. The surface shall be free of crazing, de-lamination, blisters larger than 0.5 inch in diameter, and wrinkles of 0.125 inch or greater in depth. Surface pits shall be permitted if they are less than 0.75 inch in diameter and less than 0.0625 inch deep. Voids that cannot be broken with finger pressure and are entirely below the resin surface shall be permitted if they are less than 0.5 inch in diameter and less than 0.0625 inch thick.
- v. Wall Thickness: Fiberglass manholes 48” in diameter and up to 20 feet in depth will have a minimum wall thickness of 0.3125 inches. Fiberglass manholes 48” in diameter and 20 feet to 30 feet in depth will have a minimum wall thickness of 0.5 inches.
- w. Diameter Tolerance: Tolerance of inside diameter shall be +/- 1% of required manhole diameter.
- x. Load Rating: The complete manhole shall have a minimum dynamic-load rating of 16,000 lbs.(HS-20) when tested in accordance with A.S.T.M. 3753 8.4 (note 1). To establish this rating the complete manhole shall not leak, crack, or suffer other damage when load tested to 40,000 lbs. and shall not deflect vertically downward more than 0.25 inch at the point of load application when loaded to 24,000 lbs.
  - i. Where manholes are located within 10-feet of the edge or under the roadway, they shall be capable of withstanding HS-20 load rating.
- y. Stiffness: The manhole cylinder shall have the minimum pipe-stiffness values shown in the table below when tested in accordance with ASTM D3753, 8.5 (note 1).

<u>LENGTH - FT.</u>	<u>F/AY - PSI</u>
3 - 6.5	0.75
7 - 12.5	1.26
13 - 20.5	2.01
21 - 25.5	3.02
26 - 35	5.24

- z. Soundness: In order to determine soundness, the manufacturer shall apply an air or water pressure test to the manhole test sample. Test pressure shall not be less than 3 psig or greater than 5 psig. While holding at the established pressure, inspect the entire manhole for leaks. Any leakage through the laminate is cause for failure of the test. Refer to ASTM D3753, 8.6.
- aa. Chemical Resistance: The fiberglass manhole and all related components shall be fabricated from corrosion proof material suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with the wastewater collection system.

bb. Physical Properties: Physical properties shall be as follows:

	Hoop <u>Direction</u>	Axial <u>Direction</u>
Tensile Strength (psi)	18,000	5,000
Tensile Modules (psi)	0.6 x 10 <sup>6</sup>	0.7 x 10 <sup>6</sup>
Flexural Strength (psi)	26,000	4,500
Flexural Modules (psi)	1.4 x 10 <sup>6</sup>	0.7 x 10 <sup>6</sup>
Compressive (psi)	18,000	10,000

cc. Test Methods: All tests shall be performed as specified in ASTM D3753 Section 8. Test method D-790 (see note 5) and test method D-695.

dd. Quality Control: Each completed manhole shall be examined by the manufacturer for dimensional requirements, hardness, and workmanship. All required A.S.T.M. 3753 testing shall be completed and records of all testing shall be kept and copies of test records shall be presented to customer upon formal written request within a reasonable time period.

- i. As a basis of acceptance the manufacturer shall provide an independent certification which consists of a copy of the manufacturer's test report and accompanied by a copy of the test results stating the manhole has been sampled, tested, and inspected in accordance with the provisions of this specification and meets all requirements.
- ii. Repairs: Any manhole repairs are subject to meet all requirements of this specification.

## 2.4 SERVICES

### A. Gravity Sewer

- 1. Service wyes - no service tees
- 2. Minimum four (4) inch diameter.
- 3. Service line material shall be Sch. 40 PVC (Foam-core pipe not acceptable)
- 4. Minimum 30" to maximum 60" lateral end depth at property line without special approval
- 5. Service Lateral Markers
  - a. For service installations along roadways having or to have concrete curb/gutter – station of the service lateral end shall be identified by an "S" stamped into the concrete curb/gutter normal to the lateral end location and the lateral end shall be marked by a treated 4" x 4" timber (minimum 2' bury and 2" above grade projection)
  - b. For service installations not along roadways or along roadways

without concrete curb/gutter - Service lateral end markers shall be fiberglass. Marker shall have a minimum ground penetration of 18" and shall extend a minimum of 36" above local grade. Marker shall be Green in color throughout its mass. Marker shall be installed at the end of each gravity sewer lateral stubout at the Right-of-Way/Easement line.

- c. Each marker shall be affixed with four (4) permanent, reflective decals legibly presenting the following information and arranged in the following order (top to bottom) on the marker:

Reflective Decal (No Text)

"Caution Sewer Lateral End"

"The Town of Loxley (251-964-5162) CALL BEFORE DIGGING"

"Depth At Marker \_\_\_ Feet"

- d. The sewer lateral end depth shall be measured vertically from the final local ground surface and shall be entered into the blank using indelible marking. Marker shall be as manufactured by Carsonite, or approved equal.
- e. The Town of Loxley shall furnish all decals to be affixed by installer to the blank marker provided by the installer. Installer shall determine and enter depth measurement.

**B. Pressure Sewer**

1. Main line service taps shall be accomplished as follows:
  - a. For Non-HDPE Main – Service Saddle with double Stainless Steel straps (1½" FIP Outlet), 1½" Brass Corporation Stop (MIP x CTS Compression)
  - b. For HDPE Main – HDPE Tapping Tee (1½" Outlet) with Integral 1½" HDPE Ball Valve (1½" CTS Compression Outlet)
  - c. Service Saddles shall be Mueller, McDonald, JCM, Romac, or approved equal
2. Service lines shall be 1½" CTS DR11 HDPE, or larger
3. Service Brass - Mueller or McDonald
4. Service Box - PVC (Green) with "SEWER" cover marking and otherwise as specified herein for Water Facilities
5. Service End Fittings - Ball Valve and Check Valve within Service Box Solids Handling Pump Stations

**C. Wet Well**

1. Precast concrete in conformance with ASTM C478 with Type II cement and 100% calcareous aggregate; Mastic joint seals. Fiberglass Wet Wells shall be one-piece monolithic designed unit constructed of glass-fiber



reinforced, supplier certified, unsaturated commercial grade polyester resin, and shall be manufactured in strict accordance with ASTM D-3753

2. Entirety of wet well interior, except for bottom, shall be lined with sprayed-on polyurethane liner after installation (Sprayroq, or approved equal)
3. Six (6) foot minimum diameter; Integral anti-flotation collar
4. Wet Well top shall be above 100-year flood elevation and shall have minimum four -inch (4") top vent
5. Five (5) foot minimum depth from lowest inlet sewer invert to bottom
6. All process piping and fittings within pump station limits (to include within wet well and continuously through discharge valve vault) shall be Asphaltic-lined, Flanged, Ductile Iron, Cl. 53 minimum
7. Minimum 150 psf live load rated hinged aluminum access hatch with a certified OSHA hatch for fall protection
8. All nuts, bolts, hardware, etc. within wet well shall be Type 304 stainless steel
9. No visible leaks or deficiencies

D. Solids Handling Pumps

1. Suction Lift - Gorman Rupp or WEMCO (Suction legs shall, in their entirety, be of welded, Sch. 40 steel with provision included for flushing suction leg without piping disassembly or entering wet well)
2. Suction lift pump stations shall include a containment area with a suitable drain that drains back to the wet well.
3. Submersible – Flygt ,WEMCO, or WILO (Dual 2" Stainless steel lift-out rail system)
4. Pump installation shall be duplex
5. Any suction lift pump installation shall include an acceptable, enclosed, all-weather structure to house pumps, motors, controls, and ancillary equipment. Structure shall include a lockable personnel door and a lockable overhead-type door adequately sized to accommodate transit of installed components. Structure shall be properly lighted and ventilated, feature a sloped-to-drain concrete floor, provide minimum eight-foot (8') interior ceiling height, and provide a minimum five feet (5') of unobstructed horizontal clearance in all directions between installed equipment and structure wall. Structure shall be constructed of low-maintenance components (all wood construction shall not be acceptable).
6. Valved by-pass pumping connection on force main within station site
7. Concrete valve vault with 150 psf live load rated aluminum cover containing discharge gate valve and check valve for each pump

- E. Electrical and Controls
1. Four (4) sealed level sensing floats acceptably mounted within wetwell
  2. Type 304 stainless steel NEMA 3R control enclosure with aluminum dead front door
  3. Three-phase utility power unless specifically approved otherwise
  4. All lift stations shall have a lightning arrestor installed between each incoming power and ground. This lightning arrestor would be best located inside the main circuit breaker enclosure and connected to the line side of the main circuit breaker.
  5. Manual transfer switch
  6. All lift stations shall include an appropriate receptacle for connecting to a portable emergency generator if required.
  7. All conduit runs whether or not terminated in boxes shall be capped or plugged to prevent the entrance of foreign matter until wires are pulled.
  8. Outlets, switches, boxes, etc. shall be rigidly secured and located properly with respect to easy accessibility.
  9. No wiring shall be pulled until all conduit and boxes are permanently in place. Each branch circuit shall be separately controlled with a ground neutral for each circuit. Circuiting shall be indicated on the construction plans.
  10. All feeders and branch circuits are to be color coded maintaining the same color on the same phase.
  11. All conduit runs under grade shall be rigid conduit from outlet to outlet, with 18 inches minimum cover. Waterproof construction techniques are to be used on all couplings to make installation water tight.
  12. Solid-state soft motor starters or Electronic Variable Frequency Drives unless specifically approved otherwise
  13. Elapsed run time meters for each pump and pump combination
  14. Alarm light with 'Dim Glow' power monitor feature
  15. Provision of phase monitors, surge suppressors, intrinsically safe relays, audible alarm
  16. All controls and devices shall be compatible for connection to and communication with The Town of Loxley SCADA system. At minimum, SCADA outputs to be available shall include: Utility Power Status, Wet Well Level, Status of Each Pump (Off, On, Failed), Elapsed Run Time Meter Reading (For Duplex Installation - Pump1, Pump2, Pump1+Pump2)

## **2.5 INDIVIDUAL SERVICE GRINDER PUMP STATIONS**

- A. Provision, installation, ownership, operation, and maintenance of the grinder pump system shall be the responsibility of the customer.

- B. Pump and pump system shall have at minimum five (5) years acceptable performance experience in at least five (5) domestic installations comprising a minimum of 500 total systems
- C. Pump shall be capable of completely macerating the constituents commonly encountered in domestic sewage and feature minimum pumped fluid delivery capability of 7 GPM against a discharge head of 185 feet.
- D. Installation shall feature at least a simplex pump and include a fiberglass pump well capable of storing approximately 70 gallons of flow volume after activation of an integral high level alarm without overflow or interruption of service
- E. Station shall feature a pump mounting and power connection system that enables pump removal, exchange, and reinstallation without entering or voiding the pump well. Pump discharge connection, inclusive of discharge valve and piping disconnect, and assembly for disconnection and reconnection of a sealed, watertight pump power supply shall be located no greater than twelve inches (12") below the top of the pump chamber.
- F. Station shall include all level sensing and electrical components to control pump operations. Any/all electrical or control connections, junctions, and/or components located within the pump chamber shall be accessible for service but shall be sealed against moisture and shall not be adversely affected by submergence upon flooding of the pump chamber.
- G. Station shall derive electrical service from a standard 230 volt / 1 phase / 60 hertz residential power system. Installation shall include connection to served-structure power via power disconnect panel located within 15 feet of pump installation.
- H. Station shall receive sewage via gravity plumbing from the served structure with a service clean-out located immediately prior to the station.
- I. Station shall deliver sewage to the utility pressure sewer service connection at the property line via minimum 1¼" service pipeline.
- J. Properly load-rated non-corroding pump lift-out assembly shall be securely affixed to the pumping unit and shall extend to the top of the pump chamber where it shall be securely fastened via stainless steel safety hasp.

## **2.6** FORCE MAINS AND PRESSURE SEWERS

- A. Pipe shall be Asphaltic-lined Ductile Iron (Cl. 52), PVC (Cl.200 SDR 21, Green), or HDPE (DR 11 with Green Marker Stripe)
- B. Force Mains - minimum four (4) inch diameter; Pressure Sewers - minimum two (2) inch diameter; unless specifically approved otherwise.
- C. Fittings 3" diameter and larger shall be asphaltic-lined, MJ ductile iron (CL350-C110 or C153). For smaller than 3" fittings, secure The Town of Loxley prior approval of proposed material and joint restraint system.
- D. Ductile iron pipe for force mains shall be furnished with push-on (PO) type joints

(i.e. Tyton, Fastite, etc.). Joints shall be in accordance with ANSI/AWWA C111/A21.11, latest revision, and shall be furnished complete with all necessary accessories. For certain installations, the ENGINEER or the OWNER may require ductile iron pipe having restrained joints (RJ). The allowable methods of joint restraint specified herein shall be utilized where required.

- E. Ductile iron pipe for force mains shall be Thickness Class 52 as specified in ASTM A746 or pressure class pipe rated for a 350 psi working pressure. Pressure class pipe shall be designed and manufactured in accordance with AWWA C150 and AWWA C151 for a Type 2 laying condition.
- F. Minimum of eighteen (18) LF of restrained pipe shall extend in each direction from all valves, fittings, and specials on 3" and larger pipelines. For smaller than 3" pipelines, secure the Town of Loxley prior approval of proposed pipe and joint restraint system.
- G. Gate valves shall be as for Water Facilities
- H. Cast iron valve box with "SEWER" cast into cover. Upper 18" - 24" section of valve box riser shall be cast iron, lower riser sections may be of CI 200 PVC. Riser sections shall be in alignment and securely centered on valve stem. Box shall include concrete retaining collar and internally routed locator wire as for Water Facilities.
- I. Retainer Glands shall be as for Water Facilities
- J. Tapping Sleeves shall be as for Water Facilities
- K. Automatic air/vacuum release assemblies shall be installed at all high points along pipeline route and shall be housed in concrete vaults. (APCO, Crispin, Val-Matic or approved equal)
- L. Pressure sewers to include acceptable flushing assemblies at all upstream terminations and intermediate points as determined necessary
- M. Pipeline shall have no visible leaks or deficiencies
- N. All pipeline shall include a locator wire with reinforced protective exterior coating (12 ga., Solid, Green Color, Brass Split Bolt Connectors) installed centered on and 12" - 18" above pipeline. Wire shall be Copperhead or approved equal and shall extend to grade within valve boxes with minimum 12" slack. Split bolt connectors and bare wire ends at all connections and splices shall be acceptably coated to prohibit corrosion.
- O. Pipeline shall have installed at final surface grade at intervals not greater than 1000 feet a magnetized locator wire termination box with cast iron cover, Green in color, and brass wire lugs with locator wire securely attached. Box shall include concrete retaining collar as for Water Facilities. Box shall be Copperhead "SnakePit" Lite Duty or approved equal.
- P. Hydrostatic Test Requirements - Pipeline shall be successfully hydrostatically tested at a minimum of 100 psi (+/- 5 psi) for a 2-hour period. Test pressure shall be monitored via a recording pressure chart (minimum 12-inch chart diameter)

located at the highest elevation within the test section. At conclusion of the test period, the last test step shall be a pump-up to initial test pressure. Test shall be terminated, while recording pressure chart remains connected, by a bleed-off of test pressure from a site within the test section remote from the recorder location to confirm entire test section is active. Total gallons used during the test, inclusive of final pump-up, shall be measured by a suitable, certified-accurate water meter and, for the test to be considered acceptable, shall not exceed 0.71 gallons per inch-diameter per mile of pipeline tested. The test chart, with annotations thereon regarding the calculation of leakage and bearing a statement regarding test success, shall be certified by an Alabama-registered Professional Engineer. The recording pressure chart utilized for this test shall have been certified accurate by a recognized entity not more than six (6) months prior to the test and a copy of such certification shall be furnished with the test chart.

- Q. All test results to be certified by an Alabama-licensed Professional Engineer  
Pipeline Markers
- R. Pipeline markers shall be fiberglass. Marker shall have a minimum ground penetration of 18” and shall extend a minimum of 36” above local grade. Marker shall be Green in color throughout its mass. Marker shall be installed at not greater than 1000-foot intervals along the pipeline route positioned at the nearest Right-of-Way / Property line.
- S. Each marker shall be affixed with four (4) permanent, reflective decals legibly presenting the following information and arranged in the following order (top to bottom) on the marker:

Reflective Decal (No Text)

“Caution Sewer Pipeline”

“The Town of Loxley” (251-964-5162) CALL BEFORE DIGGING”

“Normal Offset From Marker \_\_\_\_\_ Feet”

- T. The offset distance shall be measured normal from the pipeline and shall be entered into the blank using indelible marking. Marker shall be as manufactured by Carsonite, or approved equal.
- U. The Town of Loxley shall furnish all decals to be affixed by installer to the blank marker provided by the installer. Installer shall determine and enter offset measurement.

**2.7 PIPELINE & VALVE MARKERS**

- A. Pipeline markers shall be fiberglass. Marker shall have a minimum ground penetration of 18” and shall extend a minimum of 36” above local grade. Marker shall be Blue in color throughout its mass. Marker shall be installed at not greater than 1000-foot intervals along the pipeline route positioned at the nearest Right-of-Way / Property line.
- B. Each marker shall be affixed with four (4) permanent, reflective decals legibly presenting the following information and arranged in the

following order (top to bottom) on the marker:

Reflective Decal (No Text)

“Caution Water Pipeline”

“The Town of Loxley (251-964-5162) CALL BEFORE DIGGING” “Normal  
Offset From Marker \_\_\_\_\_ Feet”

- C. The offset distance shall be measured normal from the pipeline and shall be entered into the blank using indelible marking. Marker shall be as manufactured by Carsonite, or approved equal.
- D. The Town of Loxley shall furnish all decals to be affixed by installer to the blank marker provided by the installer. Installer shall determine and enter offset measurement.

### **PART 3 - MISCELLANEOUS**

#### **3.1 CASINGS**

- A. Casings installed by dry bore and jack shall be coated, welded steel having minimum 0.25” wall thickness and diameter not less than 1.3 times the maximum outside diameter of the carrier pipe joint assembly, unless specifically approved otherwise. Casing to be installed by direct bury may be of PVC pipe (minimum SDR 35) on a case-by-case basis with same sizing requirement as for steel. Casing ends shall be sealed to carrier pipe via flexible end seals.

#### **3.2 CARRIER PIPE INSTALLED WITHIN CASINGS**

- A. Carrier pipe installed within casing shall be minimum Cl. 51 ductile iron with restrained joints or Cl 200 SDR 21 PVC with provision for joint restraint, unless specifically approved otherwise. Ductile iron carrier pipe may be direct installed within casing with The Town of Loxley prior approval. All carrier pipe not ductile iron shall be fitted with securely attached appropriate pipeline spacers installed as per pipeline and spacer manufacturers’ recommendation. Spacer system shall position the carrier pipe along the casing centerline. Spacers shall be two-piece, heavy-duty, polymer-coated carbon steel or stainless steel similar to Advanced Products and Systems, Inc. Model SI. Spacers shall be as manufactured by APS, CCI, Cascade, or approved equal.

#### **3.3 NOMINAL PIPE RESTRAINT**

- A. All water main, sanitary sewer force main, and pressure sewer shall include restrained pipe extending a minimum of eighteen (18) LF in each direction from all valves, fittings, and specials. Additional thrust restraint shall be provided as determined appropriate by the design professional.

#### **3.4 SPECIAL PIPELINE MATERIAL TRANSITIONS - HDPE TO PVC OR DIP**

- A. Transition from HDPE piping to PVC or DI piping shall feature a transition assembly comprised of a butt-fused HDPE section with a protruding circumferential anchoring web (Anchor Ring), if changing pipe size – a butt-fused

HDPE reducer (Reducer), a butt-fused HDPE coupling providing a standard MJDI bell end configuration (Bell MJ Adapter with Kit), MJ gaskets (standard or transition), and wedge-type retainer gland for PVC/DI. HDPE components shall be as manufactured by Independent Pipe Products, or approved equal.

### **3.5 EASEMENTS**

- A. Any proposed utility infrastructure intended for conveyance to The Town of Loxley that is not located within a dedicated public right-of-way or property to be deeded to The Town of Loxley shall be encompassed within a Utility and Ingress/Egress Easement granted to The Town of Loxley. Each such Easement shall be a minimum of twenty (20) feet in width centered upon the utility, with the utility located not closer than five (5) feet from any boundary of such Easement, and extend continuously along the utility with direct access to the Easement from a dedicated public right-of-way. The form of the Easement shall be acceptable to The Town of Loxley.

### **3.6 PIPELINE CONSTRUCTION CLOSURE SECTION**

- A. A new section of pressure pipeline may be connected to an active segment of the water or sewer system utilizing a Pipe Closure Section upon receipt of prior approval from The Town of Loxley. Upon such approval, the following minimum requirements and protocols shall be applicable:
- B. Any and all Pipe Closure actions shall be accomplished under the observation of The Town of Loxley. Contractor/Engineer shall provide The Town of Loxley a minimum of 24-hours written notice of commencement.
- C. Pipe Closure section length shall not exceed ten (10) feet.
- D. Pipe Closure shall utilize all Ductile Iron Pipe and fittings. All joints shall be restrained.
- E. Pipe Closure shall be accomplished utilizing solid sleeves. No “bucking” of the pipe shall be allowed.
- F. Pipe Closure materials and the ends of the installed pipelines to which connection is to be made shall be thoroughly cleaned and washed during preparation for installation. No trench waters, trash, dirt, debris, etc. shall be allowed to contact or enter the pipe materials or piping ends after cleaning.
- G. Applicable to Water System projects only, immediately prior to installation the interior and joining surfaces of all Pipe Closure materials and the ends of the installed pipelines shall be thoroughly swabbed with a highly chlorinated water solution.
- H. After Pipe Closure installation has been accomplished, the section shall remain exposed and subjected to full local Town of Loxley line pressure. The section shall be closely examined for any leakage. Any and all leakage shall be corrected.
- I. Upon the Town of Loxley concurrence, the section may be backfilled in accordance with project requirements.

**END OF STANDARD SPECIFICATIONS FOR WATER MAINS, SANITARY  
SEWERS AND PUMP STATIONS**